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THE IDEAL OF A UNIVERSITY.

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A University is educational because it is scientific; a school is scientific because it is educational.

It is not so much a question of science taking cognizance of life, as of life taking cognizance of science.

There has never been a period when, as at the present moment, the question of education—especially of higher university education—has been so prominently in the minds of the English-speaking nations as a question of practical interest. There are several causes which have conduced to this wide-spread and active interest; though none of these alone can be said to be the really efficient one. First, a need for reform has been realized and urged from within, *i. e.,* by the teachers and officials of the universities themselves. Then, public munificence has in England as well as in America been directed towards the universities, and the question has naturally arisen as to the best uses to which wealth thus bestowed can be put. Lastly, the needs of actual, material life, the necessity of regulating commerce and industry—all the arts of peace and war—by the highest intelligence available in the nation, have been felt more strongly than ever before. It has been realized that those countries in which the highest intellectual education is most directly and immediately brought to bear upon the problems of actual life, where science and life, so far from being divorced, are most closely wedded together in united action towards the increase of public efficiency and prosperity, that those nations are advancing rapidly; while those where this is not the case are likely to fall into retrogression, whatever may be their natural resources and the strength of their tradition of national wealth or predominance.

As regards the movement for university reform from within, there have been in America and Great Britain a number of thoughtful and experienced university teachers who have the interests of their own universities at heart, as they constantly bring enthusiasm and intelligence to bear upon the problem of advancing science and improving the intellectual life of the nation to which they belong. Their number in English-speaking countries is great, and they may fairly be said to represent the leaders of the nation's intelligence. In America, I would single out one name among a host, as the man who has done more than any other in following up his expressed views by the actual organization of a university embodying, for the time being, the elements of modern needs in a tangible example and model university, the very establishment of which has gone far to influence the spirit and the work of all the other American universities—I mean Dr. Gilman, the first President of the Johns Hopkins University.

In England, the most momentous reform of the great English universities, during more than six centuries of continuous activity, was initiated with the new statutes which came into operation in 1880. This reform, approaching near to a revolution of the whole system, had its origin within the universities themselves, and was supported by the majority of university teachers at Oxford and Cambridge, who (with all fairness to the more conservative students who acted in all conscientiousness) may be said to have represented the most prominent teachers and researches in the universities and in the country. If, for the sake of symmetry, I were to select one name as a leading representative of this movement, I should single out that of the late Professor Henry Sidgwick of Cambridge.

But the intellectual atmosphere within the universities of both countries had, for a long time, been modified and prepared by the fact that a large number of university teachers in both countries have travelled and studied abroad, especially at the universities of Germany. While there imbibing the current methods of learning and research, they realized the ideals which underlie and actuate the intellectual life of German universities, as well as the elements in which these differed from the ideals current in their own country. Such comparative study, besides freeing their minds from provincial prejudice, and raising their standards of academic efficiency, brought home to them with great force the crying need for academic reforms in their own universities.

As regards the action of public munificence: A number of new universities and colleges have been founded in the United States, as well as in the provinces of England, by private generosity. Many of these new American universities are excellent and promising foundations. In many cases, however, the means supplied are ludicrously inadequate for the maintenance—not to speak of the higher development—of real universities. Frequently these new institutions were started in localities where there already existed one or more colleges of ancient standing, which were merely in want of financial support to rise to a higher state of efficiency. In a country which has the inestimable advantage of a large number of higher institutions of learning, diffused all over the land, the question is not so much one of extension as of concentration. The injudicious foundation of such ill-equipped new bodies has not only burdened the land with an intellectual incubus and obligation; but it has seriously jeopardized the development of the older institutions—both together tending to prevent any approach to an ideal university education and a consequent advance of the intellectual vitality of the nation. Had the misguided philanthropists bestowed their funds for the endowment of new studies or new chairs in the existing institutions; or better, for the adequate remuneration of the professoriate; or, better still, had they transferred their funds unconditionally into the hands of competent and trustworthy officials to bestow them where needed—nothing but good could have resulted.

In England, on the other hand, there has been for centuries a practical monopoly of university education on the part of Oxford and Cambridge, retarding even the advance of a great metropolitan university in London. The need for decentralization in this sphere of national life has rightly been felt to be paramount. In recent years, the timely advent of private generosity has resulted in the foundation of several colleges and universities in the "provinces," especially in the great manufacturing centres, which certainly tend to supply a crying want, and which may, if wisely directed, lead to the quickening of university life, and to a new era of higher education in the British Empire. But up to the present there is danger lest these foundations, with their shortsighted, hand-to-mouth policies and ideals, may retard and vitiate, rather than advance and elevate, the higher learning of Great Britain. The founder or founders of such bodies insist upon carrying out their own preconceived notions as to the needs, the purpose or the utility of a university, crude notions based upon some individual experience or taste in their own life or education —or even trade. A bias may thus be given to the organization, to the aims and to the spirit of the work, which is far from harmless, which cannot be remedied subsequently when bitter experience has led to the recognition of a mistake; for a bias in the very foundations affects the durability as well as the usefulness and beauty of a structure. There is in the minds of such people either a total absence of ideals, or a mistaken ideal as to the nature and purpose of universities; and their views are rapidly being absorbed by the whole nation, perhaps thus retarding the intellectual advance of an empire.

The thoughtful among us must often realize that "public munificence" is not an unmixed blessing. It is one of the charges which the opponents of congested capital may urge against the possession of great wealth by one person, that the power it gives to an individual may be directed into channels affecting public life and wide-spread interests *without responsibility.* In fact, any inquiry as to capability, motive or responsibility, where actions decidedly have the character of charity and philanthropy, readily assumes the appearance of the ungenerous and ungrateful. Still, it may fairly be questioned, whether the action of individuals—whose good intentions are unassailable—in giving a positive and definite direction to the spirit and methods of public work, and in affecting the distant future of higher national life by some preconceived theory or conviction held by one to whom the nation would never have looked for guidance in such matters, may not be nefarious.

If the possible evils arising out of misdirected munificence apply to the foundation of universities, they apply to the endowment of scholarships, purses and all other forms of endowment leading or forcing or bribing the young to learn. These present the readiest, most common and most manifest form of doing something for learning and for the poor, while at the same time it requires least thought and trouble to the donor who wishes "to do the right thing." In former ages, when, on the one hand, national institutions of learning were not organized or readily accessible, or when the learned class of "clerks" was chiefly enlisted from the poor, there was a call for the wide application of such benefaction. But to-day, whatever good may be manifest in individual cases, the need no longer exists—nay, I strongly hold that the existing profusion of such scholarships in schools and universities in England effectively blocks the way to the spread of the highest spirit of education, and that the tendency of further endowments of this kind is to *pauperize the national intelligence.* I do not mean research-scholarships, but those given to support the student at school or university during the period of his preparatory education. The sums recently lavished towards helping the learners would have been more effectively used if devoted to the refinement and elevation of the centres where the highest learning is to be given. I am reconciled to the splendid bequest of Mr. Cecil Rhodes, because it embodies, impresses, and perpetuates a great idea of significance to the world's history: the international, the uniting power which the higher intellectual life possesses among the nations who represent civilization. The huge sums thus given by Mr. Rhodes will not be wasted if they merely serve to bring before the eyes of the world this common tie of humanity and perpetuate this lesson. But the same cannot be said, for instance, of the signal generosity which Mr. Carnegie has shown to his native Scottish land. One of the several reasons why England lags behind Scotland in the diffusion of university education among its population lies in the overgrowth of such endowments in England. The present system of scholarships has gone far to jeopardize the traditions of higher learning in England; while in Scotland the appreciation of—nay, the enthusiasm for—learning is one of the most valuable national assets; and I sincerely trust that Mr. Carnegie's well-meant philanthropy may not seriously threaten the existence of this national virtue.

Lastly, we come to the strong desire for reform of the university system which is wide-spread among the general public both in England and in the United States.

Both countries have exceptional advantages for the advance of national prosperity in the possession of great capital and of natural resources. But, while Great Britain sees its long-standing position of commercial and industrial predominance threatened, the United States recognizes the stupendous potentiality of its future economic development and is anxious now to prepare for its realization; nay, seeing still farther and deeper, it has misgivings with regard to the period when the fortune inherent in virgin soil and the vigorous, untrammelled spirit of young enterprise will no longer be its peculiar advantage over the competing nations of the Old World.

More and more, though in a vague and loose way, the public has come to realize, on the one hand, the practical use of Science, and, on the other, a deficiency in our educational system which does not produce a sufficiently immediate application of scientific achievement to the needs of actual life. This has been impressed still more forcibly when the competition of a country like Germany in commerce and manufacture is keenly felt, a country, moreover, which is not blessed with any of those advantages in capital or natural resources, or any previous position of vantage from which to begin its onward movement of economic ascendency. In every class it is being realized that something must be wrong when England appears to be falling back where Germany is advancing. Cheapness of labor alone cannot account for this, especially in view of the advance of American industry and the dearness of labor there. But the merchant and manufacturer find that the principle of organization and direction of work in their own spheres, that the "staff," from the highest to the lowest, are more efficient even when Germans leave home and come into competition in other countries: that the clerks, the travellers, the chemists, and electricians employed from Germany are more efficient and successful. There may be, perhaps justly, some reasons for accounting for this superiority less wounding to our national self-esteem. But it seems to be universally felt by the leaders of our commerce and industries that men are better trained for these practical economical purposes in Germany than they are at home. "Something must be wrong at home," they feel and freely say. "What are our schools and universities for? They must take immediate cognizance of our national wants. They have been going on for years and centuries in their happy-go-lucky old-fashioned way of training clergymen and gentlemen. Let them now respond to the crying needs of life."

The first phase of the movement following upon the indefinite discontent is the one we have now attained to, both in England and the United States. I should like to call this the Technical

Phase. And, though I believe in technical education when rightly conceived and rightly pursued, the present is, I sincerely hope, merely a phase of transition in the establishment of the true ideals of national education. Each member of the community made discontented with our educational system through the sensitive channels of material self-interest, desires to see reform or improvement in the immediate sphere of his own narrow horizon. Though not as grotesquely unintelligent as the butcher whose letter a head-master of a prominent school in one of our great manufacturing towns showed me, their views are the same in kind. The butcher wrote that "he desired his boy to be a good butcher, and that only those subjects should be taught to his lad which would make him that." But the would-be educational reformer who is a merchant demands that our universities, if they are to be of use to the country and have his support, should at once establish Commercial Departments or Colleges. If the industry be concerned with one aspect of chemistry or brewing, or tanning or weaving, the narrow and disjointed part of "applied" chemistry, the art (or science) of brewing, tanning and textile studies, and every conceivable division of craft and learning are to have their departments, or, at least, are to be directly considered in the teaching of a university. The same applies to agriculture and the other occupations of modern life. That is what, in the minds of such people, is meant by "the universities' taking cognizance of life."

In a less grotesque form, eminent men of light and leading have given public expression to views which, if they do not advocate such absurd developments of our national educational system, tend to encourage such views. We are constantly reminded of the great use which universities and men of higher science in Germany are to the advance of national prosperity; but the fact is ignored that in Germany the government and the people at large are by tradition and training prepared to appreciate the utility of such higher education and of higher science, and make direct appeal to the sources of highest information. The German manufacturer is sufficiently well educated to follow sympathetically the efforts of men of pure science, whether in chemistry, in physics, in mathematics, in history or languages and literature, to respect their high vocation and to encourage them in their pursuits. Such a man will, for instance, employ twenty chemists who are carrying on researches in directions remote from the industrial chemistry applying to his immediate manufacture, where in England there are but two chemists carrying on "hand-to-mouth" science for the unimproved production of staple articles which will soon be superseded by new articles evolved out of higher scientific research.

In these views of our advocates of university reform the cart is put before the horse. The applicability of science to the actual needs of economic life is increased and made facile by the intelligent readiness of the public to receive it and, above all, to possess some correct notion of its nature, its province, its methods and aims. The premature intrusion of the "technical" point of view will only retard this reasonable application, as it will lower or stultify the efforts of true men of science.

Even Germany seems for the moment to be contaminated by this lowering atmosphere of technical science which penetrates into all strata of national education. It is not likely to do them much harm, because the traditions and living effectiveness of their highest scientific institutions are so strong that they are bound to predominate, to modify, and to direct the work and the teaching of their technical institutions (nearly all the teachers of these are drawn from the professoriate of their universities), and the strength of these traditions will probably outlast the momentary contamination before it has reached the core of the intellectual life of the nation. Germany is, in every phase of its intellectual life, at this moment living on the work of its great thinkers and workers of the generations immediately preceding our own, of which Virchow may be the last representative—though a large number of younger university professors are prepared to maintain the spirit of the past in its highest and purest form.

What the German universities have done for their national life, and what they stand for in the eyes of the world, is the establishment and the diffusion of the Spirit of Thoroughness which goes down to the root of things and aspires to the summit of human knowledge. Germany is great in this respect, because the intellectual life of the nation and the educational system have, in their very constitution and in the actual history of their development, been regulated by the highest aims, the highest attainments of intellectual life, in their universities, to which all the lower forms lead or tend. These highest attainments and ideals are not left to themselves as the haphazard result of the lower necessities of education; the schools do not so much produce the universities as the universities infuse their spirit of thoroughness and their intellectual ideals into the schools. Both thus react upon the people and upon the actual material and economic life of the whole nation. The teaching of the industrial sciences, of agriculture, of medicine, nay, of school-mastering, is carried on by men trained in the universities in the spirit of pure science as there cultivated. Thus, as an ever-present force beyond the confines of the universities themselves, in all strata of national life, whether consciously held or indirectly and vaguely felt as a remote tradition, there is before the nation the true ideal of a university.

The possession of true ideals may be one of the most practical, not to say material, assets of an individual or a nation. As it may be the most practical method of setting out on a journey before all things to know exactly the journey's goal, so it is most important in the organization of national education to be clear as to the highest goal in the development of intellectual life. As we often find it important to correct the morbid tendency of the unpractical man, the doctrinaire, the visionary, by reminding him of the impracticability of his ideas and by directing his attention to the physical conditions which decide their realizability—the ways and means—so it may often be necessary to remind the "practical man," the man of action or the opportunist, to look to his fundamental principles and his ideals, and only then to set his practical energies in the direction prescribed by them. This is especially the case when the work is concerned with wider, more general, as well as more fundamental subjects and organizations, which are not ephemeral but which determine the life of a nation for ages to come.

A university is for a nation the nearest approach, as a recognizable, tangible, and living institution, to the ideal of man's intellectual development—as, in another way, the churches are the tangible and recognizable centres of the moral and religious life, and the art academies, museums, and theatres of the æsthetic life, of a nation.

It is not the outcome of vague theorizing, but the result of sober observation and experience, which leads us to conclude that the German educational system is thus efficient because, not only does its whole organization culminate in this highest type, the university, with its pure ideals of science and learning, but because the keynote of the whole intellectual education, down to the elementary schools (*a fortiori* for the technical schools) is struck by this highest form, at once most general and comprehensive as well as special and thorough. It thus penetrates through all layers of society and has become a national characteristic. Life takes cognizance of science. The more civilization advances, the greater becomes the need for the regulation of practice by theory, the more important for each state that universities should be thus efficient and should be organized in view of the highest and purest ideals of science and learning.

This view of a university, however, is far from being the predominant one in England and the United States. The mistake with us is that, until quite recently, the only conception of a university has been purely educational, if not pedagogic. It was considered an establishment for the higher training of a small percentage of the inhabitants in each country, chiefly of the upper or professional classes. It was simply a higher school—really a high-school for older boys.

I think it so important that this fatal misconception should be exposed and that the right view should prevail, that I do not shrink from applying the two methods which the late Bishop Creighton considered powerful instruments of education—exaggeration and paradox. A university, then, differs from a school in that it is not primarily educational; a great part of its function in national life would remain if there were not a single pupil or student within its walls to teach. The spirit of the place should be as different from that pervading a school as—though in quite a different way—the atmosphere of the real practical life which follows upon the university studies is to the graduate entering upon his active vocation in the struggle for existence. Each will produce the greatest effect educationally, the more each is true to its own peculiar spirit. For the moment I choose to ignore the directly educational function of a university; though, by maintaining its impersonal and purest ideal as the national embodiment of highest science and learning, it becomes most efficient as an educational institution for the production of the active and successful as well as cultured citizens.

But the real danger at this moment comes, not so much from the confusion of a university with a school, as from its contamination by the technical spirit. Here lies the real danger. The startling and epoch-making discoveries made of recent years by the application of science to the needs of commerce and industry have at last impressed the unthinking with the use of science, until such tangible use has become the test for its right of existence, the justification for its pursuit. The institutions where "science" is cultivated and advanced are supposed to derive their claim to existence and support from such use, and their organization and work are to be regulated in view of the direct application of science and learning to the needs of life.

Not only in such a view is a narrow and grossly material aspect of economical life substituted for the whole of the intellectual life of a civilized community; but science is narrowed down to the most irrational conception of applied science, the very nature and function of which are grossly misunderstood. For one instance of applied science which has produced results appreciable by the commercial mind, innumerable attempts and experiments are made in every direction without such results; there is a continuous and vast expenditure of reasoning power about us constantly at work, which never comes to the cognizance of the public and can never be apprehended by the commercial mind. Just as, to use a trite simile, the stupendous fortunes made by one great speculation, and which obtrude themselves upon the public notice, are not true tests of the effort and the energy expended in the whole world of finance and commerce, of which nothing rises to the plane of manifest and startling public recognition.

A puerile attempt to organize the study of "hand-to-mouth" science with a view to achieving such signal success in its immediate application, will end in failure. For the weakness of the "technical" aspect of science is, that, not going sufficiently deep, it does not carry science farther. Empiricism in science is most "unpractical," because it leaves to chance what the human mind in its highest theoretical function tends to control. Most of the discoveries and inventions which have had such momentous bearings upon our material and industrial life could never have been made but for the work of the highest scientific theorists, carried on in a spirit in no way technical, which is, in one aspect, opposed to practical application—at all events, ignores it while the inquiry is progressing. I mean scientific work which has no manifest practical application. Examples are innumerable and are familiar to those who are at all conversant with true science. Let me but single out a few.

The most recent invention is perhaps the most startling and, in some ways, the most momentous as regards its effect upon life in our age—I mean Wireless Telegraphy.

Yet I am not overstating my case when I say that this invention is inconceivable without a continuous series of purely theoretical inquiries preceding it. In one sense, it is but a corollary of the general scientific and purely theoretical work, in its bearings upon electricity, done by Faraday, by Sir Humphry Davy in his separation of Sodium and Potassium, and finally by Hertz and Clerk-Maxwell in their theoretical work upon certain electrical waves. Perhaps it may be said that the development of most of Modern Physics, in its minutest practical applications, could not have been achieved without the purely theoretical work of Sir Isaac Newton grouping round his discovery of the law of gravitation.

The work of Pasteur, whose whole life illustrates the realization of the highest scientific ideals, has led to the most varied applications of scientific principles to the needs of human life—nay, of industries concerned with our daily subsistence. The same may be said of Cohn, whose researches into Bacteriology were begun in a purely theoretical study of botany; or of Lister's application of these general biological results to antisepsis. Nay, it would be easy to show how the thoroughness of such theoretical work on micro-organisms has directly influenced brewing and many other industries, besides advancing agriculture in all its ramifications. But the main point to bear in mind is: that it is inconceivable how any amount of technical work in brewing, in industrial or agricultural chemistry, could by itself have produced the "practical and material" results which commerce and industries now exploit. These were only achieved by the concentration of all intellectual power, in a strictly scientific method, on pure theory, without any thought of practical application. One small outcome of the stupendous theoretical work of the great chemist Bunsen is the "Bunsen burner," known to nearly every artisan. I venture to say that, without the establishment of the theoretical principle therein involved, the main factors underlying the development of locomotion in the motor-car, as well as many other practical results, would never have been attained. Professor Ewing informs me that his researches which led to the establishment of the property of *hysterisis* in metals (now in direct use and constant application by manufacturers of metal and engineers), was the result of purely theoretical work with no immediate apprehension of its practical use even after it was made. I wonder what the giant in pure mathematics, Gauss (who made the famous toast: "I drink to Pure Mathematics, the only science which has never been polluted by a practical application"), would think of the practical application of his *Methode der Kleinsten Quadrate;* or La Place, were he to see the results of his work on the Doctrine of Probabilities in daily application in the offices of actuaries and Life Insurance Companies.

I could continue page after page to give striking illustrations, which would all show how the most momentous and practical inventions of "Science" were either directly made by the pursuit of research in its highest and purest theoretical form, or, at least, could not have been made unless based upon such work. I could show that the life of "Science" upon which the material prosperity of a nation depends, can only be advanced, can only progress into the dim regions of the unknown and unachieved, through the conscientious labor of individuals who make up what constitutes a real university, who realize and maintain its spirit.

But in view of the pressure of actual life and of the clamor of ignorant popular opportunism, it is no easy task to maintain this spirit of pure science and learning, both for the individual "professors" of such a high vocation, and for the institutions which ought to be their natural home—the universities. The temptations and allurements of material, mercenary reward are often too great for the man of science, and the insinuation of the immediately "technical" spirit into the universities is the rock ahead in their course of beneficent action for the nation and the world at large.

It requires the supreme effort of self-repression, the constant presence of the living ideals, enforced upon the workers by the atmosphere of the universities supported by the government and by public opinion, to produce effective scientific work, and to maintain this efficiency, upon which even the ultimate material well-being of the whole community depends. The premature intrusion of secondary application, of practical and economic use, into any scientific inquiry is likely to prove fatal to its fruitful termination. The standard and test of the value of higher academic work are in no way to be this "application." If anything, it is wiser to adhere to Gauss's paradox—it will in the aggregate prove to be more practical and profitable to the national life as a whole. The chairs of pure mathematics and of Sanscrit are to be regarded as equally important and equally worthy of honor and support as the chairs of mechanics and agricultural chemistry.

It is in the interest of the nation that these high and pure ideals of a university, as above all the impersonal centre of the nation's striving after truth, be maintained—nay, that by the action of the government, of munificent patrons, and of the whole public, they be enforced and be diffused and made familiar among the population itself. Life will then take cognizance of Science to the advancement of both.

I have endeavored in the above merely to impress the most important, the essential one, among the ideals which a university implies; and I have, moreover, impressed this chiefly by insisting upon its bearings on actual life, especially the economic aspect of life. When such an ideal is developed and insured in a university, the technical training and technical institutions, no doubt of deep importance to the nation, will derive inspiration from the universities and will be all the more efficient. Without such ideals, however, I doubt whether technical training will be of great or lasting advantage.

CHARLES WALDSTEIN.